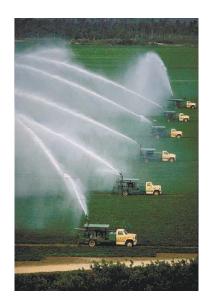
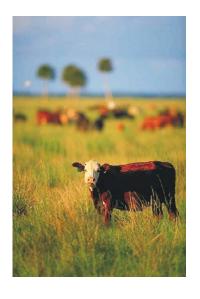
Goals and Performance Measures for the Lake Okeechobee Sediment Management Feasibility Study

C-11650











June 2001





Goals and Performance Measures

Lake Okeechobee Sediment Management Feasibility Study

C-11650

South Florida Water Management District West Palm Beach, Florida

June 2001



Table of Contents

Section	1.	Introduction	1- <mark>1</mark>
Section	2.	Conceptual Model of Lake Okeechobee Internal Phosphorus Loading	2- <mark>1</mark>
	2.1	Introduction to Internal Loading and Related Issues	2-1
	2.2	Conceptual Internal Loading Model of Phosphorus in Lake Okeechobee	
	2.3	Application of Conceptual Model in Defining Performance Goals and Measures for	
		Internal Phosphorus Loading	2-6
Section	3.	Sediment Management Goals, Performance Measures, and Potential Impacts	3- <mark>1</mark>
	3.1	Overview	
	3.2	Goal 1: Maximize Water Quality Improvements	
		3.2.1 Performance Measure 1A: Minimize Time to Achieve Phosphorus Target	3-6
		3.2.2 Performance Measure 1B: Maximize Reductions in Water Column	
		Phosphorus Concentrations	3-12
		3.2.3 Performance Measure 1C: Maximize TSS Reductions in the Short Term and	
		Long Term	
		3.2.4 Performance Measure 1D: Minimize Algal Blooms	3-17
		3.2.5 Performance Measure 1E: Minimize Exceedances of Water Quality Standards in the Short Term and Long Term	2 20
		3.2.6 Performance Measure 1F: Minimize Downstream Impacts	
	3.3	Goal 2: Maximize Engineering Feasibility and Implementability	
	<u>0.0</u>	3.3.1 Performance Measure 2A: Maximize Technical Reliability	
		3.3.2 Performance Measure 2B: Maximize Technical Scalability	
		3.3.3 Performance Measure 2C: Maximize Equipment and Material Availability	
		3.3.4 Performance Measure 2D: Maximize Permanence	
		3.3.5 Performance Measure 2E: Minimize On-Shore Land Use Needs and Conflicts	
		3.3.6 Performance Measure 2F: Satisfy Permitting Requirements	3-31
	3.4	Goal 3: Maximize Cost Effectiveness	
		3.4.1 Performance Measure 3A: Minimize Construction Costs	
		3.4.2 Performance Measure 3B: Minimize Operation and Maintenance Costs	
		3.4.3 Performance Measure 3C: Maximize Benefits (Material Reuse)	
	3.5	Goal 4: Maximize Environmental Benefits	
		3.5.1 Performance Measure 4A: Maximize Benefits to Wetland Vegetation in Littoral Zon	
		3.5.2 Performance Measure 4B: Maximize Benefits to Submerged Aquatic Vegetation	3-40
		3.5.3 Performance Measure 4C: Maximize Benefits to Fish and Aquatic Invertebrate	0.40
		Communities	
		3.5.4 Performance Measure 4D: Minimize Negative Impacts to the Manatee	
		3.5.6 Performance Measure 4F: Minimize Negative Impacts to the Okeechobee Gourd	3 -4 7
		3.5.7 Performance Measure 4G: Minimize Negative Impacts to the Snail Kite and	5-43
		Wading Birds	3-51
	3.6	Goal 5: Maximize Socioeconomic Benefits	
	0.0	3.6.1 Performance Measure 5A: Maximize Regional Socioeconomic Benefits	
		3.6.2 Performance Measure 5B: Minimize Environmental/Social Inequities	
		3.6.3 Performance Measure 5C: Maximize Community Acceptance	
		3.6.4 Performance Measure 5D: No Impacts on Water Supply and Lake Operations	
	3.7	Summary	3- <mark>63</mark>
Section	4.	References	4- <mark>1</mark>
Cootion	E	Classon	E A
Section	5 .	Glossary	ວ-[ໄ

Tables

Table 2 Overview of Mathematical Models

 Table 3
 Summary of Goals, Performance Measures, and Potential Impacts

Table 4 Summary of Goals and Performance Measures/Objectives (page 3-5 in text)

Table 5 SIC Codes for Alternative Analysis (page 3-55 in text)

Figures

Figure 2 Lake Okeechobee Site Map

Figure 3 Total Phosphorus Content in Surficial Sediment – 1998

Figure 4 Ecological Zones and Spatial Distribution of Sediment Types

Figure 5 Simplified Diagram Illustrating Major Processes and Transport Pathways Involved in Internal Loading of Phosphorus in Shallow Lakes

Figure 6 Effects on Internal Loading of Organic Matter Sedimentation Accompanying Eutrophication

Figure 7 Generalized Diagram Representing Internal Loading of Phosphorus from Sediments

Figure 8 Effect of Changes in Benthic Fauna on Sediment-Water Exchange Rates

Figure 9 Representative Input/Output Relationships for the Linked SWAN-LOHTM-LOWQM Models

Figure 10 Predicted Lakewater Phosphorus Concentrations with Time (External Load = 121 tonnes/year)

Figure 11 Predicted Lakewater Phosphorus Concentrations with Time (External Load = 496 tonnes/year)

Figure 12 Steady State Response Time as a Function of Sediment Load Reduction

Figure 13 Summary of Goals and Performance Measures

Figure 14 Relationship of Light Extinction Coefficient, k_e, in Lake Okeechobee & Tripton and Chlorophyll *a* Concentrations

Appendices

Appendix I Working Hypotheses – Lake Okeechobee Conceptual Model

Appendix II The Importance of Considering Biological Processes when Setting Total Maximum Daily Loads (TMDL) for Phosphorus in Shallow Lakes and Reservoirs

Appendix III Development of a Conceptual Internal Loading Model for Phosphorus in Lake Okeechobee

Appendix IV Florida Administrative Code 62-302